

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Pre-Shaped Shrink-On Closures for Containers and a Method for Producing the Same

- We, VISCOSÉ DEVELOPMENT COMPANY LIMITED, a British Company of 185 London Road, Croydon, Surrey, formally of 40 Chancery Lane, London, W.C.2., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- 10 This invention relates to improvements in pre-shaped shrink-on closures for containers and a method for producing the same, and more especially to closures for containers such as bottles, screw-capped or lidded cans and the like.
- 15 After a bottle or like container has been filled and closed by a so called primary closure such as a cork, cap, screw stopper or the like, it is known for reasons of hygiene, security or appearance, to apply to the bottle neck a secondary closure in the form of a ring or cap which covers the primary closure. This secondary closure may for example, be formed from metal foil, pleated or crimped into position, or it may be of cellulosic or similar material formed as a ring or cap, in which case it is placed over the bottle in a wet condition and allowed to dry so that it shrinks to grip the neck of the bottle and the primary closure.
- 20 It is also known to utilise for packaging purposes thermoplastic material which has been pre-stretched under the influence of heat and cooled so that it remains in a stretched condition. Such material has a "reversion characteristic", that is to say that when reheated, the material will shrink, tending to return to its original shape and dimensions before pre-stretching. Thus an article may be packed in such material. The material then being subjected to heat so that it shrinks to conform tightly to the surface of the article concerned. It has been proposed to apply secondary closures to bottles in this manner. In practice, however, owing to the nature of the pre-stretched closures it is difficult to apply such closures to containers on a production line, while still obtaining closed containers which are uniformly neat in appearance.
- 25 The present invention provides a method of forming pre-shaped shrink-on closures of thermoplastic material, wherein a blank of thermoplastic material which has been rendered heat-shrinkable is placed on a former of the desired shape, is subjected to heat in order to cause it to shrink onto said former and is then cooled and removed from the former, the dimensions of the former and the initial reversion characteristic of the said blank being so selected that after removal of the pre-shaped closure from the former it retains sufficient latent shrinkage to allow subsequent application of the closure to a container by further heat-shrinkage.
- 30 Advantageously a blank for use in the method may be produced by cutting sections from an extruded thermoplastic tube pre-stretched in such a manner as to render the tubing heat-shrinkable. A method for the production of such tubing is described in British Patent Specification No. 1699/64 (Serial No. 1,045,324).
- 35 According to one embodiment of the invention, for the production of a secondary closure for a bottle the said blank initially comprises a length of heat-shrinkable thermoplastic tubing, the said former being of conical shape, so that the resulting pre-shaped closure comprises a frusto-conical skirt. Advantageously the former is shaped as a truncated cone, the said blank and the

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former being of such relative dimensions that the resulting pre-shaped closure has an inwardly directed annular flange at the narrow end of said frusto-conical skirt. Such a closure is especially convenient to apply to a bottle, the skirt being so dimensioned that the inwardly directed flange can rest on the top of the bottle or primary closure in order to locate the skirt accurately in position, thus providing for a more uniform appearance of the final closure.

In a further application of the method of the invention for the production of a composite closure, a self supporting closure element is positioned on said former before the blank is applied thereto, the blank subsequently being shrunk over the former together with the closure element, being firmly attached to said element and then being removed, together with said element, from the former. For example in producing a secondary closure for a bottle as referred to above, the specified closure element may comprise a disc corresponding in diameter to the smaller diameter end of the frusto-conical former, said disc being positioned as specified on said portion of the former so that it becomes located within the narrow end of the resulting closure in order to form a composite closure cap. Such a composite closure is neat in appearance, especially when said disc is provided with a peripheral rebate for accommodating the inwardly directed flange of said skirt.

The invention is illustrated by way of example in the accompanying drawings in which:

Figs. 1 and 2 show in cross-section, stages in the production of a pre-shaped closure for use as a secondary closure for a bottle,

Figs. 3 and 4 are respectively sectional elevations of two embodiments of former for use in the production of such a closure, and

Fig. 5 is a sectional elevation of a further embodiment of closure which can be produced according to the invention.

Referring to Figs. 1 and 2, in order to form a shaped composite closure suitable as a secondary closure for a bottle, a sleeve 1 of the desired length (allowing for longitudinal shrinkage) is cut from prestretched thermoplastic tubing and located around a frusto-conical former 2 with the upper end of the sleeve projecting beyond the top of the former. The sleeve 1 is located at its lower end by means of a circumferential platform 3 projecting radially from the former 2. A disc 4, corresponding in diameter to the upper end of the former 2 is located thereon within the upper end of the sleeve 1. The periphery of the disc 4 is provided with a rebate 4a.

After the disc 4 and the sleeve 1 have been correctly positioned the latter is subjected to heat so that it shrinks around the former 2 and the disc 4. The sleeve 1 accordingly assumes

the shape shown in Fig. 2, having a frusto-conical skirt portion 1a and an inwardly directed annular flange 1b disposed within the rebate 4a of the disc 4. Preferably the disc is formed of thermoplastic material compatible with that of the sleeve 1 and after shrinkage of the latter as shown the flange 1b thereof is welded to the disc 4 by application thereto of an annular heat sealing device, not shown. Alternatively the sleeve 1 and disc 4 may be united by other means, for example by glueing. After cooling of the sleeve 1, the composite pre-shaped closure is removed from the former 2 and stored for use. Owing to the frusto-conical shape of the closure a plurality of such closures may conveniently be stored stacked one within another. A composite pre-shaped closure as described above provides a neat and attractive secondary closure for a bottle, and can be applied thereto in a simple manner merely by placing it over the top of the bottle so that the disc 4 rests on the bottle or the primary closure, and subjecting the skirt portion 1a to heat so that it shrinks around the neck of the bottle. If desired, the upper surface of the disc 4 may be printed or embossed and the skirt 4 may also be printed and/or distinctively coloured.

In order to facilitate removal of the composite closure from the former 2, the latter may be constructed as shown in Fig. 3 or 4. In Fig. 3, the former is constructed in two parts, comprising an outer sleeve portion 2a and a relatively movable inner portion 2b the upper end of which comprises the top of the former. After formation of the composite closure, it may thus be removed therefrom in a simple manner by upward movement of the portion 2b. The former of Fig. 4 is in one piece, having a central passage 5 to which may be attached a source of compressed air for unseating the composite closure. This former is also provided with a central recess 6 in the upper surface, the purpose of which will be described below.

According to a further example of the invention a composite closure may be formed, similar to that of Figs. 1 and 2, which also incorporates a primary closure for a bottle. Such a closure is shown for example in Fig. 5. The closure comprises a disc 4 similar to that shown in Figs. 1 and 2, with the exception that it is of greater thickness and is additionally provided with a circumferential groove 4b. It has also at the lower surface thereof a plug portion or cork 7 so that it comprises a stopper for insertion into the neck of a bottle. In order to form such a composite closure, a former is used having a recess in its upper surface, for example the recess 6 of Fig. 4, into which the cork 7 is inserted. A sleeve 1 is then shrunk onto the former as described above so that it conforms to the latter and to the disc 4. Owing to the groove 4b in the disc the sleeve 1 becomes interlocked there-

with as shown in Fig. 5, so that no further means of attachment is required. This has the advantage that the secondary closure provided by the sleeve 1, can be removed from a bottle closed by the stopper and can also be completely removed from the stopper itself, so that the bottle has a presentable appearance after opening thereof. In order to apply the closure shown in Fig. 5 to a bottle the stopper, with the skirt 1 thereon, is inserted in the bottle in the normal manner, and then the skirt 1 is caused to shrink around the bottle neck as described above.

In another example of the invention, a simple pre-shaped secondary closure for a bottle may be formed by shrinking onto the former 2 of Fig. 1 a sleeve of heat shrinkable thermoplastic tubing or a heat shrinkable cap of thermoplastic material, for example a cap as described in British Patent Specification No. 10884/63, (Serial No. 1,015,713), the disc 4 being omitted. In this case the resulting closure consists solely of a shaped ring with a frusto-conical skirt portion 1a and an internally directed flange 1b, or of a flat topped cap with a similar frusto-conical skirt portion. A shaped ring may also be formed as a frusto-conical skirt without such an internally directed flange, the narrow end of the skirt in this case being of less diameter than the top of the bottle so that the ring will overlap the top of the bottle when shrunk into place thereon.

In all of the above examples of the invention, it is important that the dimensions of the former relative to those of the thermoplastic tubing, and the reversion characteristic of the latter should be so selected that the pre-shaped closure after removal from the former retains sufficient latent shrinkage to allow subsequent application to a container by further shrinkage thereof. The effective length of the former may vary in accordance with the desired length of the ring, and the length of the sleeve to be applied to the former should allow, where appropriate, for the necessary overlap to produce an internally directed flange of the desired size. The amount by which the tubing can overlap the former or the top of a bottle is governed by the reversion characteristic of the sleeve. For example a tube of the dimensions below specified, when finally shrunk onto a bottle, can overlap the rim of the bottle or closure by up to about 1/4".

According to one example of the invention a length of tubing was applied to a frusto-conical former as described above in order to produce a secondary closure in the form of a pre-shaped ring. The dimensions of the tubing before shrinkage were as follows: length 6.5 cm; flat width 5.1 cm; longitudinal reversion characteristic 24%; transverse reversion characteristic 31%. The dimensions of the former were as follows: upper diameter

2.7 cm; lower diameter 3.1 cm; length 5.5 cm. After shrinkage of the tubing onto the former it was in the form of a frusto-conical ring 5.3 cm long and having upper and lower diameters of 2.8 cm and 3.2 cm respectively. On subsequent final shrinkage of the ring, the transverse reversion characteristic of the ring was found to be as follows: upper end 17%; lower end 30%.

The closures described above may be formed of any suitable material, the sleeve 1 being, for example, polystyrene or polyvinyl chloride and the disc 4 being, more especially when the two parts are to be welded, of the same material or, for example, of polyethylene. The above closures may also, if desired, be modified in a number of respects. For example the disc 4 shown in Fig. 5 may be replaced by a disc as shown in Figs. 1 and 2, or vice versa, the method of attachment of the sleeve 1 to the disc being correspondingly changed. Also the disc 4 of Fig. 5 may be constructed as a one-piece stopper instead of having a separate plug or cork 7 attached thereto. Furthermore the skirt 1a may be provided with perforations to facilitate tearing of the secondary closure when it is to be removed from the bottle.

A closure as shown in Fig. 5 is claimed in Patent Specification No. 1591/67 (Serial No. 1,088,552).

#### WHAT WE CLAIM IS:—

1. A method of forming pre-shaped shrink-on closures of thermoplastic material wherein a blank of thermoplastic material which has been rendered heat-shrinkable is placed on a former of the desired shape, is subjected to heat in order to cause it to shrink onto said former and is then cooled and removed from the former, the dimensions of the former relative to those of the blank and the initial reversion characteristic of the said blank being so selected that after removal of the pre-shaped closure from the former it retains sufficient latent shrinkage to allow subsequent application of the closure to a container by further heat-shrinkage.

2. A method as claimed in claim 1, wherein, for the production of a composite closure, a self supporting closure element is positioned on said former before the blank is applied thereto, the blank subsequently being shrunk over the former together with the closure element, being firmly attached to said element and then being removed, together with said element, from the former.

3. A method as claimed in claim 2, wherein for causing attachment of the blank to the closure element, the latter is so shaped that on shrinkage of the blank onto the same the blank and the closure element become interlocked.

4. A method as claimed in claim 2, wherein the blank and the closure element are attached

together, while on the former, by welding or glueing.

5 5. A method as claimed in any one of claims 2 — 4, wherein the said closure element is itself a primary closure means, the said blank comprising a secondary closure means for sealing the primary closure means in place after application to a container.

10 6. A method as claimed in any one of claims 1 — 5, wherein for the production of a secondary closure for a bottle the said blank initially comprises a length of heat shrinkable thermoplastic tubing the said former being of conical shape so that the resulting pre-shaped closure comprises a frusto-conical skirt.

15 7. A method as claimed in claim 6, wherein the former is shaped as a truncated cone, the said blank and the former being of such relative dimensions that the resulting pre-shaped closure has an inwardly directed annular flange at the narrow end of said frusto-conical skirt.

20 8. A method as claimed in claim 7 when appended to any one of claims 2—5, wherein the specified closure element comprises a disc corresponding in diameter to the smaller diameter end of the frusto-conical former, said disc being positioned as specified on said portion of the former so that it becomes located within the narrow end of the resulting closure in order to form a composite closure cap.

25 9. A method as claimed in claim 8, wherein said disc is provided with a peripheral re-

bate for accommodating the inwardly directed flange of said skirt.

35 10. A method as claimed in claims 8 or 9 when appended to claim 3, wherein for the purpose specified in claim 3, the said disc is provided with a circumferential groove extending radially inwards.

40 11. A method as claimed in any one of claims 8—10 as appended to claim 5, wherein the closure element is in the form of a stopper, having a plug portion depending from said disc, the truncated portion of said former being provided with a corresponding recess for accommodating said plug portion.

45 12. A method as claimed in any one of claims 6 — 11, wherein the base of the conical former is provided with a circumferential platform extending radially outwards in order to provide for positive location of the length of thermoplastic tubing.

50 13. A method of forming pre-shaped shrink-on closures substantially as described herein with reference to Figs. 1 and 2 or Figs 1 and 2 as modified by any of Figs. 3 — 5 of the accompanying drawings.

55 14. A pre-shaped shrink-on closure when made by the method claimed in any one of claims 1 — 13.

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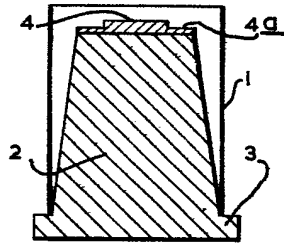


FIG. 1

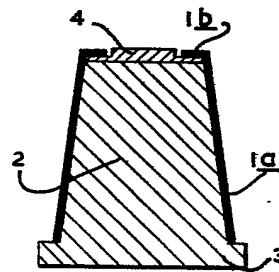


FIG. 2

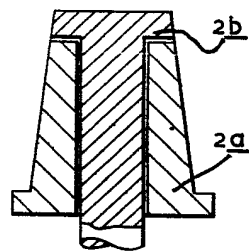


FIG. 3

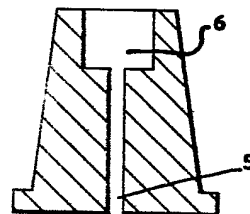


FIG. 4

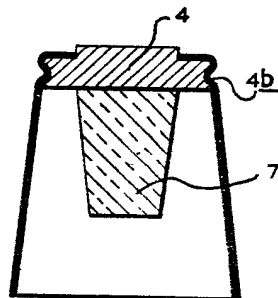


FIG. 5